

cond Series

APERS FOR WAR TIME. No. 24

Biology and War

By

J. ARTHUR THOMSON, LL.D.

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HUMPHREY MILFORD

OXFORD UNIVERSITY PRESS

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1915

1509
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no. 24

BASIS OF PUBLICATION

This series of Papers is based on the following convictions :

1. That Great Britain was in August morally bound to declare war and is no less bound to carry the war to a decisive issue ;
2. That the war is none the less an outcome and a revelation of the un-Christian principles which have dominated the life of Western Christendom and of which both the Church and the nations have need to repent ;
3. That followers of Christ, as members of the Church, are linked to one another in a fellowship which transcends all divisions of nationality or race ;
4. That the Christian duties of love and forgiveness are as binding in time of war as in time of peace ;
5. That Christians are bound to recognize the insufficiency of mere compulsion for overcoming evil and to place supreme reliance upon spiritual forces and in particular upon the power and method of the Cross ;
6. That only in proportion as Christian principles dictate the terms of settlement will a real and lasting peace be secured ;
7. That it is the duty of the Church to make an altogether new effort to realize and apply to all the relations of life its own positive ideal of brotherhood and fellowship ;
8. That with God all things are possible.

BIOLOGY AND WAR

WHEN a mason builds a wall he continually tests his work with a plumb-line, a level, and a square. He applies three different tests to make sure that he is building well. Similarly in more complex social affairs where the issue is not clear, it is useful to apply several tests. When they confirm one another they strengthen our resolution ; when they are discrepant, they show us that there is need for further inquiry.

Three familiar tests are to be found in the ideas of the conservation of energy, the conservation of life, and the conservation of moral values—physical, biological, and ethical respectively. The first test condemns an undertaking that is wasteful or that attempts to get more work done than the available energy allows ; and the useful criticism that a business man expresses when he calls a scheme unsound is often based on his discovery that physical principles are being ignored. The biological test asks whether the activities in question are consistent with the health of the individual and with the welfare of the race. The third test asks if the line of action makes for the conservation of what we hold to be most precious and most beneficent in our social heritage—the traditions of civilized behaviour, the standard of conduct, and the ideal of goodwill among men.

WAR BROUGHT TO THE TEST

We are as a nation practically unanimous that after a certain, or rather uncertain, date, war was inevitable unless we were prepared to sacrifice honour and our traditions of championing justice and liberty. But this does not affect the fact that to have thousands of wholesome men in the prime of life mowed down with machine

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guns is an extreme of wastage without parallel except in famine and plague. By the first or physical test war is condemned.

When we turn to the social or ethical test, we find that the issues are intricate. It has to be remembered (1) that there may be nobility in the determination to go to war if there is no alternative course consistent with honour, justice, and freedom ; (2) that the waging of the war may afford opportunities for courage, endurance, magnanimity, and other virtues ; and (3) that a war which can be carried through with a good conscience may leave a nation spiritually enriched. On the other hand the actual fact of war is a detestable anachronism, full of deadly peril to the character of combatants and non-combatants alike. It seems to come upon the nations because the past is still too strong for them, as a surge of reversion which sweeps them off their feet. It is for us on whom war was forced to hope and pray that the proud waters will not go over our souls.

But our special problem in this paper is to apply the second—the biological—test. Leaving, without forgetting, the social heritage, we have to ask how war affects the natural inheritance of a race, and whether there is in organic nature any object-lesson which may make clearer to us the significance of human warfare.

EFFECT OF WAR ON THE RACE

Various positions are held in regard to the effect of war on the heritable qualities of a race. There is the view of the extreme militarists that war is indispensable. The nations have to be bled periodically, else they will become soft and adipose. According to Bernhardt, 'war is a biological necessity of the first importance, a regulative element in the life of mankind.' It cannot be dispensed with, since 'without it an unhealthy development will follow, which excludes every advancement of the race and there-

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fore all real civilization'. There is the view that in ancient times war was (sometimes if not always) an eliminating process that made for progress, strengthening a tribe by the continual sifting out of those less fit for times when fighting was the order of the day; and strengthening the race by the occasional 'wiping out' of a weaker clan by a stronger; but that this useful discriminate elimination has entirely ceased with the change of conditions in modern warfare. There is the position that war is radically dysgenic—that is to say, that it persistently sifts in the wrong direction, impoverishing the race by the loss of a disproportionate number of the more chivalrous, courageous, and patriotic. The best statement of this position is to be found in Chancellor Starr Jordan's impressive *Human Harvest*. We should also recall Darwin's sentence in the fifth chapter of *The Descent of Man*: 'The bravest men, who were always willing to come to the front in war, and who freely risked their lives for others, would on an average perish in larger numbers than other men.' There is the severely scientific position that the influence of war on a nation, biologically regarded, has not yet been investigated by competent statistical methods, and that no certain conclusion can be drawn.

DISCUSSION OF THESE POSITIONS

Against the view that war is indispensable if the virile virtues are to be kept alive, it must be firmly maintained that in the tasks of peace there is ample opportunity for valour and heroism, and that the annals of exploration, investigation, medical practice, and the like are rich in illustrations of the highest courage. To admit, as we must, that there are worse things than war—slavery, softness, dishonour, and moral unsoundness generally—is not equivalent to saying that nobility cannot be kept alive without war. To admit that a nation may be forced to a crisis where a refusal to go to war would mean disgrace,

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is not to admit that the battle-field must for ever remain our final court of appeal.

It seems reasonable to draw a distinction between ancient and modern warfare. For in a battle in ancient days there may well have been a useful sifting out, on both sides, of the clumsy, the cowardly, and the cumbersome ; and a raid may have sometimes resulted in the practical elimination of the weaker of the two clans. Just as the brown rat's invasion of a country seems always to result in the extermination of the black rat, which has rather less fight in it, so it may have been sometimes in the history of mankind. But in modern warfare one nation does not exterminate another, and the battle is not always to the strong. Even if it can be proved that military efficiency does on the whole tend to secure victory, it is by no means to be taken for granted that it is based on qualities which make for soundness and progressiveness in a race.

The severely scientific position that we have not sufficient data on which to base a secure judgement, may be met by indicating three conclusions which have a high degree of probability, although statistical proof is not forthcoming.

(1) When a nation with voluntary military service is involved in war the more virile and chivalrous obey the call of their country in larger numbers, and their ranks are disproportionately thinned. Those who cannot fight are left and those who will not fight are left, and 'from the man who is left flows the current of human history', as Starr Jordan puts it. It is true that a large number of brave and desirable men must remain at home to keep things going, and that the elimination does not greatly affect the women—two facts which counteract the impoverishment of the race, but it seems undeniable that a voluntary army raised in a crisis includes a disproportionately large number of those whom the nation can least afford to lose. If the number of combatants be small compared with that of non-combatants, the casualties might not be of sufficient

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magnitude to affect the welfare of the race, but if Britain, for instance, has to raise an army of three millions and a quarter, as may be necessary, that would be about half of the male population between 18 and 45, and it would not mean every second man by lot, but a larger proportion of the more patriotic and courageous. In this way it seems almost certain that war works precisely in the wrong direction as far as the heritable welfare of the race is concerned.

(2) This is accentuated by the well-known facts that specially brave bodies of men are selected for very hazardous tasks in which the mortality is often great, and that particularly brave men run unusually great risks. The Victoria Cross has been repeatedly awarded to some hero who lost his life in the exploit which won him the distinction. It is true that the fortuitous bulks largely in the casualties of modern warfare, and that there is often no sifting at all, but simply a tragic indiscriminate elimination, as when a battleship goes down. But where sifting does occur, it tends to be in the wrong direction, cutting off the very best.

(3) There is another way in which war works in the wrong direction, by making life disproportionately difficult (and marriage often impossible) for the members of the race who are least readily replaceable. It is necessary to hold by the ideal of the state as a body politic—an organism—in which all wholesome men and women have their place and function, but it is plain enough that artists and discoverers, poets and reformers, are more precious than mediocrities. In the retrenchments that must follow a great war, in which hundreds of millions of pounds are spent unproductively, the tendency is to economize most on super-necessaries, and, unluckily, on the finer super-necessaries, such as books, music, pictures, and higher education. This must tend to handicap most severely the more highly individuated members of the community.

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The highly skilled, whose work seems to be most readily dispensed with, will be pinched most ; and they are certainly part of the salt of the earth.

WAR AND THE STRUGGLE FOR EXISTENCE

It is a common belief that the evolution of living creatures has been due to the struggle for existence, and it is a common doctrine that what has worked so well among plants and animals should be allowed to operate in mankind. In making war, it is said, we are following nature. As Bernhardi says, 'the decisions of war rest on the very nature of things. . . . The law of the stronger holds good everywhere.' This view involves numerous misunderstandings which must be pointed out.

(a) To begin with, biologists are agreed that the essential fact in evolution is the occurrence of variations or novelties. These furnish the raw materials of evolution and they are obviously indispensable. If they are to count they must be entailed or transmitted—heredity being one of the conditions of evolution. If they are to be more than beginnings they must stand the criticism of the conditions of life in which they have emerged, natural selection or natural elimination, which occurs in the course of the struggle for existence, being another of the conditions of evolution. Natural selection prunes off the relatively unfit new departures, but the struggle is not in itself the cause of progress ; it must have variations or differences of endowment to work on.

(b) Moreover the struggle for existence does not necessarily make for evolution. In many cases it thins without sifting, and that does not make for racial change. Out of 533 caterpillars of the large garden white butterfly collected by Professor Poulton, 422 died because *Ichneumon* flies had laid their eggs inside them. This was serious thinning, four out of five, but so far as we know those caterpillars that escaped being victimized were no better

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than those that perished, so that there was no sifting. The indiscriminate elimination involved in thinning turnips with a hoe benefits the surviving individuals but it does not improve the race. The only result of the struggle for existence that is of direct evolutionary importance is discriminate elimination, where the presence or absence of a particular character determines survival, or, what comes to the same thing in the long run, determines relative success in producing and rearing progeny. For it must be understood that the process of selection is often very slow and even gentle in its operations.

(c) We must also notice the obstinate confusion of thought that selection in the struggle for existence must, automatically as it were, result in the survival of something desirable. What it results in is the survival (immediate or distant) of the relatively more fit to the conditions of life. It may work towards degeneration as well as towards progress, as is well illustrated by that evasion of the struggle for existence called parasitism—the door to which is always open. The liver fluke is ‘fit’ as well as the sheep, and the tapeworm is as well adapted to its inglorious lot as the lark at heaven’s gate.

(d) But there is an even deeper misunderstanding. In spite of many protests, beginning with Darwin’s, the idea of the struggle for existence has often been expressed in a narrow and wooden way. It is a fact of life much bigger and subtler than the words suggest, and we do well to bear in mind Darwin’s proviso that the phrase was to be used ‘in a large and metaphorical sense, including dependence of one being on another, and including (which is more important) not only the life of the individual, but success in leaving progeny’. The phrase is a shorthand formula, summing up a vast variety of strife and endeavour, of thrust and parry, of action and reaction.

What are the facts of the case? Living creatures are continually being confronted with overwhelming diffi-

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culties and thwarting limitations. For some of these the living creatures are themselves responsible ; they multiply so rapidly that there is not enough food to go round, not even enough room to grow up in. We must recognize too, that in the course of time nutritive chains have been established, one creature eating another, and that another, through long series. Beyond that there is the self-assertiveness of the vigorous creature. The lusty animal tends to be at times a hustler, elbowing its way through the crowd, though at another time it will almost surpass man in its gentleness. Not less important is the irregular changefulness and inhospitality of the physical environment. In the crowdedness, the carnivorousness, and the insurgence of life we see three reasons for the struggle for existence, and the fourth is to be found in the unpredictable vicissitudes of the callous surroundings.

We have, then, an almost universal picture—insurgent creatures with a will to live, and surrounding them all manner of baffling difficulties and thwarting limitations. Whenever the creature answers back, reacts, asserts itself, girds up its loins against these difficulties, there is the struggle for existence. Where organisms do nothing or can do nothing—like the myriads of sea butterflies engulfed in the huge cavern of a baleen whale's mouth—there seems no utility in speaking of the struggle for existence. For the central idea is that of 'clash' between one organism and another or between organisms and the inanimate forces of nature.

DIFFERENT FORMS OF THE STRUGGLE FOR EXISTENCE

The struggle may be between fellows of the same kith and kin, as when locust turns upon locust, and female spider on male spider, and stag upon stag, or as in the cannibalism in the cradle that occurs in the egg-capsules of the whelk. Or it may be between nearly related species, as Darwin illustrated by the internecine competition of

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brown rat and black rat. The struggle may be between foes of entirely different nature—for instance, between carnivores and herbivores, between birds of prey and small mammals, between heather and bracken on the hills, between different kinds of trees in the tropical forest. The struggle may be between living creatures and the inanimate conditions of their life—for instance, between mammals and the winter, between plants and drought, between birds and the storm. When we compare the struggle between fellows and the struggle between foes with the third form of struggle, which we may describe as between living creatures and ‘fate’, we see that in the third mode the element of competition has dropped out. Thus perhaps we begin to see something of the subtlety of the struggle for existence. But we must go further.

THE CREATURE’S REACTIONS TO LIMITATIONS AND DIFFICULTIES

What has got into circulation is a caricature of nature—an exaggeration of part of the truth. For while there is in wild nature much stern sifting, great infantile and juvenile mortality, much redness of tooth and claw, and, outside of parasitism, a general condemnation of the unlit lamp and the ungirt loin, there is much more. In face of limitations and difficulties one organism intensifies competition, but another increases parental care; one sharpens its weapons, but another makes some experiment in mutual aid; one thickens its armour, but another triumphs by kin-sympathy. It is realized by few how much of the time and energy of living creatures is devoted to activities which are not to the advantage of the individual, but only to that of the race. Not that this need imply deliberate altruistic foresight, it is rather that in the course of nature’s tactics survival and success have rewarded not only the strong and self-assertive, but also the loving and self-forgetful. Especially among the finer types part of the

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fitness of the survivors has been their capacity for self-sacrifice. And even in the rougher forms of winnowing, must it not be recognized as part of nature's strategy that the individual organism, being kin-bound, realizes itself in subordination to the interests of the species and submits to being lost that a larger welfare for the whole may be gained ?

It is sometimes pointed out, however, that since evolution depends on individual variations and the sifting of these, we come back to the struggle between individuals. Thus Sir Ray Lankester writes : ' the struggle for existence, to which Darwin assigned importance, is not a struggle between species, but one between closely similar members of the same species.' As a matter of fact, Darwin assigned importance to many different forms of the struggle for existence, and although he heads a paragraph ' Struggle for life most severe between individuals and variations of the same species ; often severe between species of the same genus ', he did not bring forward many convincing illustrations. Not that we would doubt that there is sometimes in nature a life and death struggle between fellows at the margin of subsistence ; what we are concerned to maintain is that the decisive clash is often not between competing fellows, but between organisms and their surroundings, both animate and inanimate. It is often the environment that prunes, and the struggle for existence need not be competitive at all ; it is illustrated not only by ruthless self-assertiveness, but also by all the endeavours of parent for offspring, of mate for mate, of kin for kin. The world is not only the abode of the strong, it is also the home of the loving.¹

¹ The general thesis we are stating has had several exponents, such as Herbert Spencer and Patrick Geddes. It finds vivid expression in Kropotkin's *Mutual Aid* and Drummond's *Ascent of Man*, perhaps best of all in Cresson's *L'Espèce et son Serviteur*. Bishop Mercer has given a masterly statement of it in the *Nineteenth Century*,

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THE STRUGGLE FOR EXISTENCE AND THE WEB OF LIFE

There is another point of great importance, that the sifting that goes on in nature is necessarily in part determined by the already established inter-relations. Darwin laid great emphasis on the conception of the web of life—that nature is a vibrating system of subtle linkages. No organism lives or dies quite to itself. Earthworms have made most of the fertile soil, and their lives are curiously intertwined with those of moles and birds, centipedes and ground-beetles ; cats have to do with next year's clover crop, and with the incidence of the plague in India ; eighty seeds germinated from one clodlet on one bird's foot ; squirrels affect the harvest and water-wagtails the health of the sheep. Darwin laid emphasis on these inter-relations partly because, as a naturalist in the stricter sense, he was keenly interested in the actual life of living creatures as it is lived in nature, but partly because he discerned that the sifting that goes on must always be in relation to the threads of the web of life. There is a continual tendency in nature to link lives together, to multiply inter-relations, to make an intricate vibrating system, and the selecting or sifting must operate not blindly or haphazardly, but in relation to what has been already established. The selection of variations is very far from being a chapter of accidents. The texture of the web of life is so fine that even an apparently trivial quality may be of vital importance in securing survival and success. Those variations are rejected which are incongruous with the established correlations of organisms. This idea is of great importance in regard to human life, for here again selection is in part determined by the existing systems of linkages. Thus man has in part replaced natural selection

February 1915, which may serve as a useful correction of Huxley's famous Romanes Lecture on *Evolution and Ethics*.

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by social or rational selection. To a large extent it is his prerogative to make his own sieves.

WAR A REVERSION TO THE CRUDEST AND MOST PRIMITIVE MODE OF THE STRUGGLE FOR EXISTENCE

Socially regarded, going to war may be (in our present state of civilization) the only course open to a nation that would stand for honour, justice, and liberty ; ethically regarded, waging war may afford opportunity for the development of high virtues ; biologically regarded, war is a reversion to that mode of the struggle for existence in which rats excel, namely internecine competition. We have seen that there are many forms of the struggle for existence ; we see no escape from the conclusion that war is a reversion to the crudest and most primitive form.

If this be true, it behoves us to mingle fear with our pride, for there are serious risks of slipping down the rungs of the steep ladder of evolution. As Mr. Theodore Chambers points out in his admirable lecture on 'Eugenics and the War' (*The Eugenics Review*, January 1915) : 'it is in the actual environment of war, when excitement reigns supreme, that the most unexpected deep-seated instincts receive a stimulus. Lust, cruelty, and blood-thirstiness on the one hand ; sympathy, courage, and affection on the other seem to be intensified. War brings out into bold relief the intensest emotions of good and evil. War tears off the decent garments of custom and leaves the soul naked.'

Among non-combatants too there is apt to be deterioration as well as ennoblement. If war, in spite of being illumined by heroism and endurance, in spite of being embellished by the achievements of science, is in essence a return to the crudest form of the struggle for existence, our necessary preoccupation with it is full of danger. Some of the risks may already be seen in ungenerous and inaccurate depreciation of German culture, in unworthy scaremongering, in unkindness to aliens, in excited talk

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of barbarous reprisals and impossible humiliations, and in ill-considered readiness to rush into schemes which would mean that we were falling victims to one of the national diseases, namely militarism, which we are combating in our enemies. To quote from our Galton Lecture (*Eugenics Review*, April 1915): 'What sowings of dragon's teeth there must be in the terrible struggle of this war; is it weak to be afraid lest by and by in the crop that springs from them there may be something worse than armed men?' The past lives on in our present; the ape and the tiger die hard; there is always, as Tennyson said, a dread risk of reversion dragging evolution in the mud.

To sum up, man is fortunately not shut up to searching in nature for guidance, but if he does look carefully enough in that direction, he will find nature has another message besides, 'Each for himself, and elimination take the hindmost; contention is the vital force; and careers are open to talons.' There is another message—much harder to obey—of subordinating individual gratification to species welfare. And again, if man does insist on following, as in war, the mode of the struggle for existence in which rats excel, he must not delude himself with the hope that it will necessarily result in the survival of the fittest in any progressive sense. The most desirable types are apt to get sifted out, leaving the race impoverished.

IN CONCLUSION

The argument of this paper is that *from a biological point of view* war must be regarded with anxiety since it makes for the impoverishment of the race by sifting out a disproportionately large number of those whom we can least afford to lose, and that far from being in full accordance with nature's message to man it is a reversion to the crudest and most primitive form of the struggle for existence, and therefore to be regarded with peculiar fear. At the present time, when we are involved in a terrible war

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which we believe to be righteous, every energy should be brought to bear, 'with a single mind and with concentrated purpose, in order to achieve, successfully and gloriously, the end we have in view.' But it behoves us also to order our minds so that the issue may work towards a victory over the evil (in ourselves as well as in others) which makes war possible between Christian and civilized nations.

If this war brings racial impoverishment, as it seems bound to do, what counteractives are possible? (a) We may perhaps look for a more marked disapproval of selfish forms of celibacy and a stronger encouragement of chivalrous marriages. (b) There may spring up a freshened enthusiasm for all-round fitness and a high standard of health, and it must be granted that all improvements of 'nurture' in the widest sense are to the good as long as it is clearly recognized that veneering does not make bad wood sound. Perhaps our losses may strengthen our resolution to face the national wastage due to tuberculosis, and to improve the conditions that are in part to blame for the evils which most weaken us as a nation. (c) Some clearer understanding of what selection means may lead us to scrutinize the retrenchments which the costliness of the war will necessitate. To economize upon the nobler super-necessaries means crippling such super-men as painters and musicians. May we not try pinching ourselves in our comforts before we begin starving our souls? (d) What the biologist is most concerned with is the natural inheritance of the race, which is fundamental, and in this regard the outlook cannot but be gloomy, when Britain is losing many of the very best of her sons. But we are also concerned with our social heritage, which is supreme, with for instance our traditions and ideals of honour, veracity, courage, justice, and goodwill among men. It rests with us, each in his own way, to try to secure that if our natural inheritance is impoverished, our social heritage may be enriched.

